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frequency band bit rate

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... Division Duplex) UL and DL [more] Minimum **frequency band** required: ~ 2x5MHz **Frequency** re-use ... and 20 Mbps for MIMO systems) Channel **bit rate**: 5.76Mbps ...
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Introduction to DSL

... POTS and data is achieved by transmitting data in a **frequency band** above voice ...
Rate-adaptive transmission that adjusts to the highest **bit rate** allowed by the ...
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Advanced Wireless Group

... UWB spectrum and divides it into 3-16 non-overlapping **frequency bands**, while maintaining ...
 If low **bit rate** is required, **Multi-Band** implementations may ...
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[PPT] Providing Broadband Services over Fixed Wireless Local Loops

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 ... kbps. 128. Average **bit rate** per subscriber. 12. ... Click to add text. 12. UHF **Frequency Band** in Some Economies. USA : 471 – 809 Mhz (Ch.14 - Ch.69), 6 Mhz/ Ch. ...
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 ... are two main reasons losing high **frequency** components of ... should be processed to be **band**-limited to a ... Furthermore, under restriction of limited **bit rate**, to get ...
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Waveform Codecs

... to split blocks of the speech signal into a large numbers of **frequency bands**. ... speech, and toll quality reproduced speech can be achieved at **bit rates** as low as ...
www-mobile.ecs.soton.ac.uk/speech_codecs/waveform.html - 6k - [Cached](#) - [Similar pages](#)

Simulation of an Orthogonal Frequency Division Multiplexing Based ...

... factors on the key parameters of the system such as **bit error rate**, received signal to noise ratio, **frequency band** of employment and overall system **bit rate**. ...
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[PS] 1 Chapter 1 Video Compression

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 ... encoder can cater to the highest **bit rate** stream by ... prohibitive for more than a few **rates**; thus this ... X. **frequency band** contains the majority of the video signal ...
www.cc.gatech.edu/fac/Ann.Chervenak/8113/readings/changScaleCompress.ps.Z - [Similar pages](#)

Sumitomo Electric Industries, Ltd. | SEI NEWS vol.316 Sumitomo ...

... the technologies that provide high **bit rate** digital communications ... ADSL, it offers much faster data transfer **rates**. ... T has defined the **frequency bands** that can ...
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G.722 7 kHz audio coding within 64 kbit/s using sub-band adaptive ...

... In the SB-ADPCM technique used, the **frequency band** is split ... and the signals in each sub-**band** are encoded ... of operation corresponding to the **bit rates** used for 7 ...

www.vocal.com/data_sheets/g722.html - 9k - [Cached](#) - [Similar pages](#)



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RF design guide What is a radio module?

<<BACK NEXT>>

<<TOP

■ What is a radio module?

■ Why are radio modules necessary?

■ What type of modules are there?

■ What is a radio module?

All users want products that they can use easily, that offer good performance and that are low priced. In other words, they would like to buy radio equipment at low cost, that can be used without a radio operator license, with simple, error-free operation over a wide communication range.

There are surely very few such perfect products, and trying to create such ideal equipment is a perpetual problem for manufacturers.

Among these products that do not require a radio operator license are mobile phones and wireless LANs, a whole range of wireless data communications equipment, wireless security equipment and so on. These kinds of devices are used very widely in industrial and consumer fields.

Radio modules make up the portion of this sort of radio equipment that uses high frequencies.

■ Why are radio modules necessary?

It is often said that high **frequency** circuits do not perform as well as they should in theory, and cannot be made without experience. For this reason, for engineers who are entering the field of electrical circuit design from the design of audio equipment or logic, the threshold may seem rather high and is one reason why they hesitate to become involved. In addition there is the issue of legal regulations, and it can all seem rather a hassle.

Of course this is not actually the case, but any design that is started from scratch is naturally going to be very difficult. It is from this background that the requirement arises for just a high **frequency** element that can be built into equipment as a component (module). As the difficulty of designing the high **frequency** element and ensuring performance is taken care of, and there is peace of mind concerning the legal procedures, equipment designers can concentrate on the design of the other elements, and so they very much appreciate radio modules.

■ What type of modules are there?

The following is an introduction, according to their features, to the types of modules available.

By type of module

The types of radio modules include transmitters that only transmit signals, receivers that only receive signals, and transceivers incorporating functions for transmitting and receiving. A combination of transmitter and receiver is used for one-way communication. Transceivers are used for duplex communication.

1) 434 MHz band

434 MHz **band** radio modules transmit information data in a narrow **band frequency** and effectively utilize the radio waves. The characteristic of radio waves in the 434 MHz **band** is their comparatively wide operating range.

2) 868 MHz band

Similarly to the 434 MHz **band**, these modules transmit using narrow **band** modulation. Compared with the 434 MHz **band**, there is not very much of this equipment in use, so there are advantages from the point of view of less radio interference. Their operating range is somewhat narrower.

By frequency band**3) 2.4 GHz band**

Spread spectrum communication systems are authorized for use in 2.4 GHz low power data communication systems, and radio modules with systems that spread information data across a wide **band** are . 2.4 GHz radio waves have high straightness, and compared to 400 MHz, the radio waves have less diffraction and are inferior from the point of view of communication range. But because of the high **bit rate** and excellent security of spread spectrum communication, and its good noise immunity, the number of manufacturers using it are increasing, and the field is very congested.

The modulation systems used in these modules are FSK (CPFSK, MSK, GMSK), PSK (BPSK, QPSK, DQPSK), and ASK.

In general, ASK is easily affected by environmental conditions, and is used in micro-power radio equipment for short range communication over a few meters.

By digital modulation system

FSK and PSK are used for their reliability and communication range. FSK is comparatively low cost, small size, with low power consumption and a low error **rate**. PSK circuits are rather complex, but are used widely. The occupied **frequency band** of MSK and GMSK is narrow while the operating range is wide. DQPSK uses multi-level modulation and has a relatively narrow occupied bandwidth. With a high **bit rate** and few errors, it is used widely.

With the **frequency** used fixed at one wave and using a synthesizer system, many **frequency** channels are supported. In general, radio modules using one wave are small with low power consumption, and achieve excellent cost performance.

By frequency channel used

With modules using a synthesizer system you can switch to another channel for communication if the result of carrier sensing indicates that a particular **frequency** channel is being used.

There are also modules with a built in function that can switch channels automatically.

Depending on the **frequency** channel used, there may be limits on methods of usage such as transmission time limits and the like.

By type of oscillation circuit

There are two types of oscillation circuit, crystal and SAW resonator types. The crystal type has excellent **frequency** stability while the SAW resonator type is slightly inferior with regard to **frequency** stability, but this type is often used for its lower cost.

By data input/output method

There are two formats for inputting data in radio modules, serial data input and parallel data input. Available code formats for serial data include NRZ code, NRZI code, DMI code, Manchester code and so on. However, as occupied **frequency band** and **bit rate** have an involved

- relationship with the code format, it is necessary to check carefully which coding can be handled.
- By data transmission rate (bit rate)** Data rates range widely from several hundred bps to tens of Mbps. The **bit rate** for telecontrol can be 2,400 bps, 4,800 bps and so on, and for data transmission there are radio modules with rates in the tens of Mbps and high speed modules.
- By data processing method** Dedicated telecontrol radio modules and radio modules for data transmission must transmit simple command data and data streams. However there are modules that come with error processing protocols and data link processing protocols, and those that do not have special protocols. The former simply requires you to input data using the module's data input terminal, and the module processes it for you, whereas the latter requires the designer to give the module a proprietary transmission protocol. There are also individual modules that can be used in either way.
- By legal procedure** If you have a radio module that conforms to a standard specification, you can avoid the complex bureaucratic procedures required for authorization, and significantly reduce the time required for commercialization.
- By application** Modules that use batteries must be small sized and have low power consumption. With modules for industrial use, it is necessary to pay attention to factors in the operating environment such as working temperature, humidity and the like.

<<TOP

<<BACK NEXT>>

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